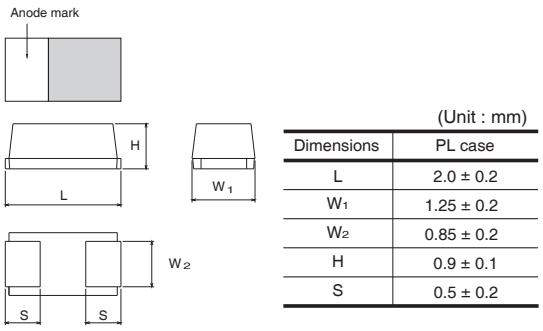
# Chip Tantalum capacitors
# (Bottom surface electrode type : Large capacitance)

## TCT Series PL Case

●**Features** (PL)
1) Vital for all hybrid integrated circuits board application.
2) Wide capacitance range.
3) Screening by thermal shock.

●**Dimensions** (Unit : mm)




(Unit : mm)

| Dimensions | PL case |
|---|---|
| L | 2.0 ± 0.2 |
| $W_1$ | 1.25 ± 0.2 |
| $W_2$ | 0.85 ± 0.2 |
| H | 0.9 ± 0.1 |
| S | 0.5 ± 0.2 |

●**Part No. Explanation**

| T | C | T | P | L | 0 | J | 4 | 7 | 6 | M | 8 | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ① | | | ② | | ③ | | ④ | | | ⑤ | ⑥ | |

① Series name
TCT

② Case style
PL

③ Rated voltage

| Rated voltage (V) | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 | 35 |
|---|---|---|---|---|---|---|---|---|
| CODE | 0E | 0G | 0J | 1A | 1C | 1D | 1E | 1V |

④ Nominal capacitance
Nominal capacitance in pF in 3 digits:
2 significant figures followed by the figure representing the number of 0's.

⑤ Capacitance tolerance
M : ±20%

⑥ Taping
8 : Reel width : 8mm
R : Positive electrode on the side opposite to sprocket hole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## ● Rated table

| (μF) | Rated voltage (V,DC) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 | 35 |
| 1.0 (105) | | | | | | | | PL |
| 1.5 (155) | | | | | | | *PL | |
| 2.2 (225) | | | | | | | PL | |
| 3.3 (335) | | | | | | *PL | | |
| 4.7 (475) | | | | | | PL | | |
| 6.8 (685) | | | | | | *PL | | |
| 10 (106) | | | | | PL | | | |
| 15 (156) | | | | | | | | |
| 22 (226) | | | PL | PL | | | | |
| 33 (336) | | | PL | *PL | | | | |
| 47 (476) | | PL | PL | | | | | |
| 68 (686) | *PL | PL | | | | | | |
| 100 (107) | *PL | PL | | | | | | |
| 150 (157) | *PL | | | | | | | |

Remark) Case size codes (PL) in the above show products line-up.
* Under development

## ● Marking

The indications listed below should be given on the surface of a capacitor.

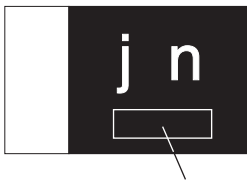
(1) Polarity : The polarity should be shown by □bar. (on the anode side)
(2) Rated DC voltage : Due to the small size of PL case, a voltage code is used as shown below.
(3) Capacitance value : Due to the small size of PL case,a capacitance code is used as shown below.

| Voltage Code | Rated DC Voltage (V) |
|---|---|
| e | 2.5 |
| g | 4 |
| j | 6.3 |
| A | 10 |
| C | 16 |
| D | 20 |
| E | 25 |
| V | 35 |

| Capacitance Code | Nominal Capacitance (μF) |
|---|---|
| A | 1.0 |
| E | 1.5 |
| J | 2.2 |
| N | 3.3 |
| S | 4.7 |
| W | 6.8 |
| a | 10 |
| e | 15 |
| j | 22 |
| n | 33 |
| s | 47 |
| w | 68 |
| $\bar{a}$ | 100 |
| $\bar{e}$ | 150 |

[PL case] note 1) $\frac{j}{(1)}\ \frac{n}{(2)}$

(1)voltage code (2)capacitance code




manufacture code

note 2) voltage code and capacitance code are variable with parts number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● **Characteristics**

| Item | | Performance | Test conditions (based on JIS C 5101−1 and JIS C 5101−3) |
|---|---|---|---|
| Operating Temperature | | −55°C to +125°C | Voltage reduction when temperature exceeds +85°C |
| Maximum operating temperature with no voltage derating | | +85°C | |
| Rated voltage (VDC) | | 2.5 4 6.3 10 16 20 25 35 | at 85°C |
| Category voltage (VDC) | | 1.6 2.5 4 6.3 10 13 16 22 | at 125°C |
| Surge voltage (VDC) | | 3.2 5.2 8 13 20 26 32 44 | at 85°C |
| DC Leakage current | | Shall be satisfied the voltage on " Standard list " | As per 4.9 JIS C 5101-1<br>As per 4.5.1 JIS C 5101-3<br>Voltage : Rated voltage for 5min |
| Capacitance tolerance | | Shall be satisfied allowance range.<br>±20% | As per 4.7 JIS C 5101-1<br>As per 4.5.2 JIS C 5101-3<br>Measuring frequency : 120±12Hz<br>Measuring voltage : 0.5Vrms +1.5 to 2V.DC<br>Measuring circuit : DC Equivalent series circuit |
| Tangent of loss angle (Df, tan δ) | | Shall be satisfied the voltage on " Standard list " | As per 4.8 JIS C 5101-1<br>As per 4.5.3 JIS C 5101-3<br>Measuring frequency : 120±12Hz<br>Measuring voltage : 0.5Vrms +1.5 to 2V.DC<br>Measuring circuit : DC Equivalent series circuit |
| Impedance | | Shall be satisfied the voltage on " Standard list " | As per 4.10 JIS C 5101-1<br>As per 4.5.4 JIS C 5101-3<br>Measuring frequency : 100±10kHz<br>Measuring voltage : 0.5Vrms or less<br>Measuring circuit : DC Equivalent series circuit |
| Resistance to Soldering heat | Appearance | There should be no significant abnormality. The indications should be clear. | As per 4.14 JIS C 5101-1<br>As per 4.6 JIS C 5101-3<br>Dip in the solder bath<br>Solder temp : 260±5°C<br>Duration : 5±0.5s<br>Repetition : 1<br>After the specimens, leave it at room temperature for over 24h and then measure the sample. |
| | L.C. | Less than initial limit | |
| | ΔC / C | Within ±20% of initial value | |
| | Df (tan δ) | Less than 200% of initial limit | |
| Temperature cycle | Appearance | There should be no significant abnormality. The indications should be clear. | As per 4.16 JIS C 5101-1<br>As per 4.10 JIS C 5101-3<br>Repetition : 5 cycles<br>(1 cycle : steps 1 to 4) without discontinuation.<br>After the specimens, leave it at room temperature for over 24h and then measure the sample. |
| | L.C. | Less than 200% of initial limit | |
| | ΔC / C | Within ±20% of initial value | |
| | Df (tan δ) | Less than 200% of initial limit | |
| Moisture resistance | Appearance | There should be no significant abnormality. The indications should be clear. | As per 4.22 JIS C 5101-1<br>As per 4.12 JIS C 5101-3<br>After leaving the sample under such atmospheric condition that the temperature and humidity are 60±2°C and 90 to 95% RH, respectiveiy, for 500±12h leave it at room temperature for over 24h and then measure the sample. |
| | L.C. | Less than 200% of initial limit | |
| | ΔC / C | Within ±20% of initial value | |
| | Df (tan δ) | Less than 200% of initial limit | |

| | Temp. | Time |
|---|---|---|
| 1 | −55± 3°C | 30±3min. |
| 2 | Room temp. | 3min. or less |
| 3 | 125± 2°C | 30±3min. |
| 4 | Room temp. | 3min. or less |


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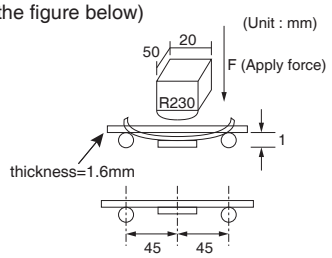
| Item | | Performance | Test conditions (based on JIS C 5101−1 and JIS C 5101− 3) |
|---|---|---|---|
| Temperature Stability | Temp. | −55°C | As per 4.29 JIS C 5101-1<br>As per 4.13 JIS C 5101-3 |
| | ΔC / C | Within 0/-15% of initial value | |
| | Df (tan δ) | Shall be satisfied the voltage on " Standard list " | |
| | L.C. | − | |
| | Temp. | +85°C | |
| | ΔC / C | Within +15/0% of initial value | |
| | Df (tan δ) | Shall be satisfied the voltage on " Standard list " | |
| | L.C. | Less than 1000% of initial limit | |
| | Temp. | +125°C | |
| | ΔC / C | Within +20/0% of initial value | |
| | Df (tan δ) | Shall be satisfied the voltage on " Standard list " | |
| | L.C. | Less than 1250% of initial limit | |
| Surge voltage | Appearance | There should be no significant abnormality. | As per 4.26JIS C 5101-1<br>As per 4.14JIS C 5101-3<br>Apply the specified surge voltage via the serial resistance of 1kΩ every 5±0.5 min.<br>for 30±5 s. each time in the atmospheric condition of 85±2°C.<br>Repeat this procedure 1,000 times.<br>After the specimens, leave it at room temperature for over 24h and then measure the sample. |
| | L.C. | Less than 200% of initial value | |
| | ΔC / C | Within ±20% of initial value | |
| | Df (tan δ) | Less than 200% of initial limit | |
| Loading at High temperature | Appearance | There should be no significant abnormality. | As per 4.23 JIS C 5101-1<br>As per 4.15 JIS C 5101-3<br>After applying the rated voltage for 1000+36/0 h without discontinuation via the serial resistance of 3Ω or less at a temperature of 85±2°C, leave the sample at room temperature / humidity for over 24h and measure the value. |
| | L.C. | Less than 200% of initial limit | |
| | ΔC / C | Within ±20% of initial value | |
| | Df (tan δ) | Less than 200% of initial limit | |
| Terminal strength | Capacitance | The measured value should be stable. | As per 4.35 JIS C 5101-1<br>As per 4.9 JIS C 5101-3<br>A force is applied to the terminal until it bends to 1mm and by a prescribed tool maintain the condition for 5s.<br>(See the figure below)<br>  |
| | Appearance | There should be no significant abnormality. | |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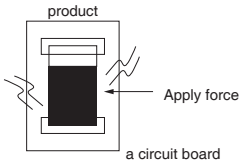
| Item | | Performance | Test conditions (JIS C 5101−1 and JIS C 5101− 3) |
|---|---|---|---|
| Adhesiveness | | The terminal should not come off. | As per 4.34 JIS C 5101-1<br>As per 4.8 JIS C 5101-3<br>Apply force of 5N in the two directions shown in the figure below for 10±1s after mounting the terminal on a circuit board.<br>  <br> |
| Dimensions | | Refer to "External dimensions" | Measure using a caliper of JIS B 7507 Class 2 or higher grade. |
| Resistance to solvents | | The indication should be clear | As per 4.32 JIS C 5101-1<br>As per 4.18 JIS C 5101-3<br>Dip in the isopropyl alcohol for 30±5s, at room temperature. |
| Solderability | | 3/4 or more surface area of the solder coated terminal dipped in the soldering bath should be covered with the new solder. | As per 4.15.2 JIS C 5101-1<br>As per 4.7 JIS C 5101-3<br>Dip speed=25±2.5mm / s<br>Pre-treatment (accelerated aging): Leave the sample on the boiling distilled water for 1 h.<br>Solder temp. : 245±5°C<br>Duration : 3±0.5s<br>Solder : M705<br>Flux : Rosin 25% IPA 75% |
| Vibration | Capacitance | Measure value should not fluctuate during the measurement. | As per 4.17 JIS C 5101-1<br>Frequency : 10 to 55 to 10Hz/min.<br>Amplitude : 1.5mm<br>Time : 2h each in X and Y directions<br>Mounting : The terminal is soldered on a print circuit board. |
| | Appearance | There should be no significant abnormality. | |

● **Standard list TCT Series PL Case**

| Part No. | Rated voltage 85°C (V) | Category voltage 125°C (V) | Surge voltage 85°C (V) | Cap. 120Hz (µF) | Tolerance (%) | Leakage current 25°C 1WV.5min (µA) | Df 120Hz (%) | | | Impedance 100kHz (Ω) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | −55°C | 25°C 85°C | 125°C | |
| ✻ TCT PL 0E 686M8R | 2.5 | 1.6 | 3.2 | 68 | ±20 | 8.5 | 60 | 30 | 40 | 4 |
| ✻ TCT PL 0E 107M8R | 2.5 | 1.6 | 3.2 | 100 | ±20 | 12.5 | 60 | 30 | 40 | 4 |
| ✻ TCT PL 0E 157M8R | 2.5 | 1.6 | 3.2 | 150 | ±20 | 18.8 | 60 | 30 | 40 | 4 |
| TCT PL 0G 476M8R | 4 | 2.5 | 5 | 47 | ±20 | 9.4 | 30 | 20 | 30 | 4 |
| TCT PL 0G 686M8R | 4 | 2.5 | 5 | 68 | ±20 | 13.6 | 60 | 30 | 40 | 4 |
| TCT PL 0G 107M8R | 4 | 2.5 | 5 | 100 | ±20 | 20 | 60 | 30 | 40 | 4 |
| TCT PL 0J 336M8R | 6.3 | 4 | 8 | 33 | ±20 | 10.4 | 30 | 20 | 30 | 4 |
| TCT PL 0J 476M8R | 6.3 | 4 | 8 | 47 | ±20 | 14.8 | 60 | 30 | 40 | 4 |
| TCT PL 1A 226M8R | 10 | 6.3 | 13 | 22 | ±20 | 11 | 30 | 20 | 30 | 5 |
| TCT PL 1A 336M8R | 10 | 6.3 | 13 | 33 | ±20 | 16.5 | 60 | 30 | 40 | 4 |
| TCT PL 1C 106M8R | 16 | 10 | 20 | 10 | ±20 | 3.2 | 30 | 20 | 30 | 6 |
| ✻ TCT PL 1D 335M8R | 20 | 13 | 26 | 3.3 | ±20 | 1.4 | 30 | 20 | 30 | 8 |
| TCT PL 1D 475M8R | 20 | 13 | 26 | 4.7 | ±20 | 1.9 | 30 | 20 | 30 | 6 |
| ✻ TCT PL 1D 685M8R | 20 | 13 | 26 | 6.8 | ±20 | 2.8 | 30 | 20 | 30 | 6 |
| ✻ TCT PL 1E 155M8R | 25 | 16 | 32 | 1.5 | ±20 | 0.8 | 30 | 20 | 30 | 8 |
| TCT PL 1E 225M8R | 25 | 16 | 32 | 2.2 | ±20 | 1.1 | 30 | 20 | 30 | 8 |
| TCT PL 1V 105M8R | 35 | 22 | 44 | 1 | ±20 | 0.7 | 30 | 20 | 30 | 8 |

✻= Under development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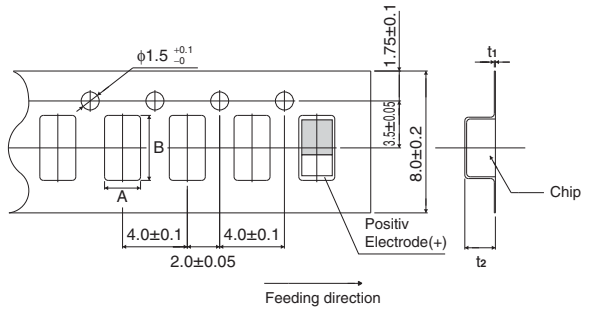
## ● Packaging specifications

(Unit : mm)

| Case code | A±0.1 | B±0.1 | $t_1$±0.05 | $t_2$±0.05 |
|---|---|---|---|---|
| PL | 1.6 | 2.4 | 0.25 | 1.05 |

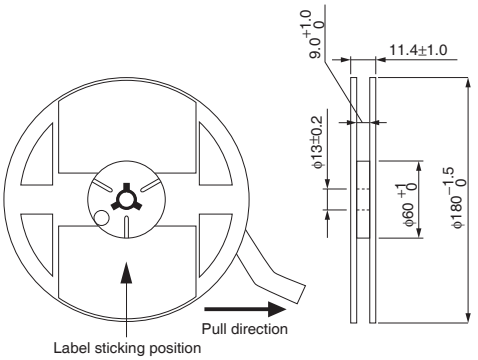
Taping [PL case]




## ● Packaging style

| Case code | Packaging | Packaging style | | Symbol | Basic ordering units |
|---|---|---|---|---|---|
| PL case | Taping | plastic taping | ϕ180mm Reel | R | 3,000pcs |

Reel [PL case]




(Unit : mm)

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